AN APPLICATION OF TOTAL QUALITY PRINCIPLES IN TRANSFORMING THE CULTURE OF CLASSROOMS

Since the conclusion of World War II, there have been continuing efforts to understand, define, and apply organizational principles associated with the production of high quality work (Deming, 1986; Jazzar & Algozzine, 2005; Juran, 1988, 1989; Scherkenbach, 1991; Scrabec, 2000; Shewhart, 1986; Tribus, 1990, 1994). During the post-war era, Japanese industrial leaders translated the theory of Total Quality Management into what has now become the modus operandi of most leading corporations around the world. In the 1980s, the organizational principles of Total Quality began to take hold in service and health related industries (Aguayo, 1990). Since then, the adoption of these organizational principles has taken place in government services and most recently in many school districts, schools, and classrooms (Audette, 1992; Audette & Algozzine, 1992, 1997; Baugher, 1992; Cohen, 1991; Downey, Frase, & Peters; 1994; Hau, 1991; Heverly, 1992; Jazzar & Algozzine, 2005; Scrabec, 2000; Washton, 1988).

The essence of Total Quality Management is the recognition that the quality of products and outcomes is the direct result of the quality of the processes or systems that produce them. From this perspective, in order to change or improve students' behavior and academic achievement, one must change or improve the school and classroom processes or systems that produce them. Furthermore, the criteria for defining quality of behavior and academic achievement are determined by the needs and expectations of the students, parents, and other citizens in a school community. The organizational principles of Total Quality Management include:

1. A clear and constant purpose (developing and refining the organizational mission);

2. Systemic thinking (recognizing and studying the causal relationships between processes and outcomes);

3. Customer focus (attending to the role needs of persons who work on the organizational processes and the expectations of those who receive or inherit organizational products and services);

4. Leadership (promoting the organizational mission and reducing or eliminating systemic barriers to its attainment);

5. Management by fact (using process and outcome data to make decisions);

6. Continuous process improvement (prioritizing, piloting, and improving organizational processes);

7. Participatory management (involving workers in planning and implementing improvements to attain the mission);

8. Human resource development (investing in workers as the most efficient means of attaining the organizational mission);

9. Teamwork (breaking down organizational barriers to facilitate worker cooperation across functions in organizational processes);

10. Long-term commitment (avoiding short term solutions by functioning with the long-term mission in mind).

During the 1990s, many public schools began to apply the principles of Total Quality Management. As they moved ahead, they discovered that most of the separate principles that comprise Total Quality Management are not new to public education. Theories and practices using similar and related ideas have been championed by educators for generations. For example, Kohn (1993) and Boyer (1992) argued against teacher-centered classroom processes (e.g., assigning work without apparent connections to life outside the classroom, allotting rewards for work). Further, Boyer (1995) and Kohn (1993) aligned with such seminal thinkers of past decades as Tyler (1949) and Dewey (1902) in their promotion of classroom processes that contribute to a culture of active inquiry where students are encouraged in their self-directed pursuit of solutions to problems that affect them inside and outside of school.

Every day, in every school, teachers and students engage in processes of teaching and learning. In some schools, classroom processes contribute to a culture of active inquiry (Boyer, 1995; Dewey, 1902; Tyler, 1949) in which the natural curiosity of students is nurtured. Prior to the recent interest in the principles of Total Quality Management, there was already considerable evidence that students' active participation in the processes of planning and assessing their own progress enhanced their love for learning (Andrade & Hakim, 1995; Caine & Caine, 1991; Candy, 1991; Dewey, 1993; Flantzer, 1993; Jaffe, 1993; Jazzar & Algozzine, 2005; Scrabec, 2000). Students' involvement in planning and assessing their own progress makes learning more concrete and clarifies for them the processes they use to acquire knowledge and skills.

In this article, we describe differences in the patterns of teaching and learning processes that emerged in a school where concepts of Total Quality Management were formally adopted and supported by administrators, teachers, parents, and students. The research provides evidence of progressive, positive improvements in students' academic achievement and behavior during the transformation to a quality learning culture.

Method

Teachers and students in two elementary (K–5) schools enrolling large numbers of students "at-risk" (greater than 80% receiving free or reduced lunch) in a large southeastern state participated in this study. All of the teachers, their administrators, and their students participated in multiple data collection opportunities over the course of the research regarding the evidence and impact of applying Total Quality principles in their classrooms. Differences were evident in the level of implementation across the schools and this variation served as the basis for our comparisons.

Intervention

A comprehensive model focused on transforming educational processes for students, teachers, administrators, parents, and the community was implemented. Total Quality Education (TQE) is both a philosophy and a set of guiding practices that represent the foundation of a continuously improving organization. TQE is the application of quantitative and qualitative methods and human resources to improve the material and services supplied to an organization, all the processes within the organization, and the degree that the needs of those served are met, now and in the future. TQE integrates fundamental management techniques, existing improvement efforts, and technical tools under a disciplined approach focused on continuous improvement (Brocka & Brocka, 1992; McClanahan & Wicks, 1994).

The professional development activities and follow-up support for the cohorts of teachers did not call for a set of specific actions that teachers should take in their classrooms. In other words, teachers were not provided with recipes for managing instruction. Rather, components of Total Quality Education were presented, modeled, and discussed. Although teachers were taught methods or tools for successfully engaging students in improving instructional activities, workshop presenters and consultants eschewed any single approach to implementing TQE in the school. Teachers were encouraged to study and reflect on philosophy and guiding practices before working with their colleagues and students to create instructional activities to improve the quality of learning.

Key components of TQE efforts evident across all grades and classrooms in the school were quality missions, quality roles, the use of quality principles to continuously improve the process of teaching and learning, and the perspective that outcomes can be continuously improved by managing processes that produce them.

Quality missions. The class missions were statements reflecting the purpose of teaching and learning. Each was developed with active participation of a teacher and his/her students. Across classrooms, learning missions reflected broad educational goals: (a) the successful learning of all students, and (b) the development of personal responsibility for social and academic behavior and learning. Having agreed on a shared purpose, students participated with their classroom teachers in developing ground rules for ways to work together to achieve their personal learning missions aligned with the class mission.

Quality roles. The classroom mission was a central part of all assessment, teaching, learning, and evaluation activities. For example, the rhythm of learning as evidenced by teacher and student roles, responsibilities, and actions is driven by the learning mission. To successfully achieve the standard course of study, teachers and students set clear expectations for behavior and learning. Students clarified the relevance of these expectations for their own benefit and their personal and class missions. Teachers and students identified outcomes and developed criteria

on which to judge achievement. They also planned how learning would take place within the classroom and monitored progress using student self-evaluations as well as teacher applied criteria. These differences in roles, responsibilities, and actions were carried out with continuing emphasis on a set of beliefs that helped teachers and students to achieve their learning missions.

Quality principles. Participating teachers were committed to removing systemic barriers to learning so that all students would achieve their learning missions. This meant they explored learning options with their students to find the best approaches to achievement and progress. They encouraged systems thinking for students to link what they were learning to their learning missions. They also used cause and effect information collected in their classrooms to better understand their students and their learning. They encouraged students to improve their work and continuously improve their learning processes. Teachers also encouraged teamwork in completion of classroom activities.

Quality perspective. The TQE context involved managing process to improve outcomes. Outside observers looking in on quality classrooms saw students actively taking responsibility for the behavior and learning that occurs there. The students were not shy about sharing their classroom mission or the data they gathered to support their efforts to achieve it. Teachers were actively involved in facilitating their students' learning. Whenever possible, students were encouraged to link what they were learning to their long-term hopes, views, and dreams.

All classrooms in both schools were included in the TQE implementation. Each class had a mission reflecting the goal of successful learning and personal responsibility for achieving it. Expectations for learning and behavior, outcomes and criteria for achievement, and processes for monitoring progress were also evident across classrooms in the schools. Activities were implemented to transform the principles of Total Quality Education into classroom instructional practices:

- ◆ Lesson plans were redesigned from a teacher-directed instructional process to a student-centered learning process, and options were included for students to take ownership of their own learning processes.

- ◆ Flowcharts and other systems thinking tools (e.g., fishbone diagrams, action planning) were used to define and plan learning activities and processes.

- ◆ Data were regularly gathered, organized, displayed, and analyzed in efforts to implement the continuous improvement process.

- ◆ Teamwork was valued, open communication was emphasized, and barriers to effective communication were regularly identified and addressed.

The perspective in these classrooms was one of shared processes focused on improving the quality of teaching and learning.

Total Quality Education is a school-wide intervention and all teachers within each school were implementing it with varying degrees of experience and fidelity. These differences served as the basis for groups used in our comparisons.

Fidelity of Implementation

As will be reported under results, evidence of key components of Total Quality Education was observed in all classrooms in the school. Consistently high rates ($M = 92\%$, range $= 86–100\%$) of use of expected instructional approaches were also evident. These outcomes suggest that teachers understood and implemented the basic components of TQE and that there was room for improvement in their levels of implementation.

Dependent Data

Instructional variables were assessed using the Stallings Observation System (SOS). The SOS is a complex, low inference observation system sensitive to different instructional methods, teaching styles, and classroom environments. Using the SOS, an observer alternatively gathers data on the teacher and his/her immediate environment and on the entire class. The categories included in the SOS have been key components of process data gathering activities in a variety of instructional and teacher effectiveness studies (Brophy & Good, 1986; Good & Brophy, 2000; Stallings, 1975, 1980).

The Classroom Snapshot (CS) of the SOS yields data on the activities of adults and students in a classroom, and domains of information can be aggregated (e.g., classroom activities, student behavior, time-on-task, time-off-task, student involvement, teacher activity). *On-task classroom activities* include behaviors such as writing, reading, answering questions, asking questions, and looking at materials. Disrupting the class, looking around, talking inappropriately, and doing inappropriate tasks are included as reflections of *off-task behaviors*. Positive predictors of student achievement, such as reading aloud, receiving instruction and explanation of new materials, reviewing and discussing, and doing drill and practice are included in *on-task student involvement* behaviors that are observed. *Off-task student involvement* activities include behaviors such as interacting socially, being disciplined, and engaging in misbehavior. *Teacher activity* is coded in one of five categories: monitoring seatwork, providing interactive instruction, organizing/managing, working alone, and monitoring off-task behavior. Total on-task and off-task behavior can also be summarized.

It was assumed that CS data represented independent, uncorrelated (most are mutually exclusive categories) time-on-task behaviors (e.g., writing, reading, answering questions), student behaviors (e.g., reading silently, reading aloud), and teacher activities (e.g., monitoring seatwork,

providing interactive instruction). In fact, low, non-significant correlations were evident between variables included in each dependent construct (i.e., classroom activity, student involvement, and teacher activity). The number of times classroom activities, student behaviors, student involvement, and teacher activities were observed was compared across classrooms participating in the project. Violations of school rules, classroom rules, and classroom procedures were monitored and compared on a daily basis using a standardized form with categories for major and minor offenses that represent misbehaviors for which disciplinary action was warranted. Discipline and classroom rule compliance was also compared across participating classrooms as an additional measure of effectiveness.

Each teacher was observed for two one-hour periods while participating in the project. Data from spring observations were used in this study. Extensive training (10 hours over 5 sessions) in the use of the CS was provided to two observers. Inter-rater agreement of 0.90 or higher was achieved on each rated item of the scale using actual classroom observation sessions as a basis for establishing reliability. Additionally, similarly high rates of inter-rater agreement were evident in random comparisons of observations gathered in target classrooms over the course of the project.

The observational items represented independent categories of behavior, and a series of univariate analyses was completed. Items were consolidated using variables reflected in the category (e.g., student behaviors, teacher behaviors, on-task, off-task). Statistical consolidation (e.g., factor analysis) was judged inappropriate based on the relatively small numbers of classrooms involved relative to the vector of variables.

Results

Participating teachers implemented Total Quality Education (TQE) principles to varying degrees. This occurred as a result of new teachers entering the system and naturally-occurring variation in phases of implementation for the intervention. SOS student/teacher interactions and classroom rule violations were compared using a quasi-experimental design and intact groups representing two types of classrooms. The Full Implementation Group ($n = 16$) was comprised of teachers using TQE for at least two years with consistently high performance of 95-100% on fidelity checks and the Partial Implementation Group ($n = 16$) was randomly selected from teachers using TQE for less than one year with lower degrees of fidelity.

Time On-Task

Means and standard deviations for classroom activities and behavior are presented in Table 1. No differences were evident in writing, reading, answering questions, asking questions, talking about academics, playing academic games, looking at materials, or moving appropriately within the room. Significant differences were observed in total on-task and off-task behavior as well as paying attention, raising hand, disrupting

class, looking around, talking inappropriately, and doing an inappropriate task. Overall, on-task behavior was significantly higher ($t = 2.19$, $df = 30$, $p < 0.05$) in full implementation classrooms ($M = 309.38$) than others ($M = 282.56$); off-task behavior was significantly lower ($t = -2.76$, $df = 30$, $p < 0.05$) in these classrooms ($M = 50.63$) than in partial implementation classrooms ($M = 87.44$). Paying attention was significantly higher ($t = 2.61$, $df = 30$, $p < 0.05$) in full implementation classrooms ($M = 100.81$) than others ($M = 65.13$); hand-raising behavior was also significantly higher ($t = 2.82$, $df = 22$, $p < 0.05$) in these classrooms ($M = 12.88$) than others ($M = 5.38$). The following inappropriate behaviors were significantly lower in full implementation classrooms: Disrupting class, looking around, talking inappropriately, and doing inappropriate tasks.

Table 1

Comparison of Classroom Activities and Student Behavior in Full and Partial Implementation Total Quality Classrooms

Category/Variable	Implementation			
	Full		Partial	
	M	*SD*	*M*	*SD*
Classroom activity				
Writing	57.94	30.67	55.25	27.31
Reading	21.00	25.76	25.69	38.97
Answering questions	4.81	5.29	2.31	1.85
Asking questions	1.88	1.59	2.50	2.10
Talking about academics	19.19	25.30	8.31	4.36
Playing academic game	18.56	33.52	4.06	9.70
Paying attention	100.81	49.97	65.13**	36.28
Raising hand	12.88	9.54	5.38**	4.72
Looking at materials	22.50	21.08	30.88	21.14
Moving appropriately	58.38	30.19	62.56	43.56
Disrupting class	0.06	0.25	1.00**	1.32
Looking around	13.19	5.55	22.19**	8.22
Talking inappropriately	12.69	7.07	22.13**	12.66
Doing inappropriate task	16.94	16.07	36.25**	28.54
Student behavior				
Total on-task	309.38	30.61	282.56**	38.21
Total off-task	50.63	30.61	87.44**	43.60

**Difference between means significant at 0.05 level.

Student Involvement

A comparison of student involvement in different classrooms is presented in Table 2. Silent reading and classroom discussions were more common in full implementation classrooms. Students in these classrooms also spent less time ($t = -3.54$, $df = 6$, $p < 0.05$) being disciplined ($M = 1.16$) than their peers in other classrooms ($M = 7.72$); they also spent less time ($t = -5.93$, $df = 12$, $p < 0.05$) engaging in misbehavior ($M = 6.98$) than students in other classrooms ($M = 19.91$). Positive, non-significant trends favoring students in full implementation classrooms were evident in observations of written work, instruction and explanations, and project work; these students also spent less time uninvolved than their classmates in partial implementation classrooms.

Table 2

Student Involvement in Full and Partial Implementation Total Quality Classrooms

Category/Variable	Implementation			
	Full		Partial	
	M	*SD*	*M*	*SD*
On-task behaviors				
Reading silently	9.88	1.61	4.17**	7.90
Doing written work	25.75	23.66	12.53	14.83
Reading aloud	5.09	1.64	11.08	2.86
Receiving instruction/explanation	17.96	9.96	11.67	6.31
Engaging in discussion	23.74	4.39	4.39**	4.80
Doing drill and practice	6.36	8.57	6.67	7.64
Taking test or quiz	0.00	0.00	0.00	0.00
Completing project	9.05	17.27	7.90	9.33
Receiving assignments	4.30	5.29	4.69	5.87
Off-task behaviors				
Interacting socially	3.56	4.87	4.23	3.68
Being uninvolved	4.97	7.23	9.32	10.96
Being disciplined	1.16	1.60	7.72**	4.32
Engaging in misbehavior	6.98	4.38	19.91**	3.52

**Difference between means significant at 0.05 level.

Total on-task behavior (see Table 3) was significantly higher ($t = 7.46$, $df = 12$, $p < 0.05$) in full implementation classrooms ($M = 102.13$) than in other

classrooms ($M = 53.64$); similarly, off-task behavior was significantly lower ($t = 3.91$, $df = 12$, $p < 0.05$) in these classrooms ($M = 16.67$) than in other classrooms ($M = 41.18$). No significant differences were evident in teachers' monitoring seatwork, organizing and managing materials, and monitoring off-task behavior or students working alone. Positive trends were evident in the extent to which teachers in full implementation classrooms ($M = 65.83$) were providing interactive instruction compared to teachers in other classrooms ($M = 34.17$).

Table 3

Teacher Activity and Student Behavior in Full and Partial Implementation Total Quality Classrooms

Category/Variable	Implementation			
	Full		Partial	
	M	*SD*	*M*	*SD*
Teacher activity				
Monitoring seatwork	1.88	3.72	0.83	2.04
Providing interactive instruction	65.83	18.79	34.17	18.28
Organizing/managing	29.79	21.00	46.67	20.90
Working alone	6.25	10.26	0.00	0.00
Monitoring off-task behavior	9.66	5.45	18.05	14.31
Student behavior				
Total on-task behavior	102.13	10.07	53.64**	14.33
Total off-task behavior	16.67	10.17	41.18**	13.37

**Difference between means significant at 0.05 level.

Discipline and Classroom Rules

Similar levels of discipline problems were evident in classrooms prior to participating in the project (White, Marr, Ellis, Audette, & Algozzine, 2001). As part of the TQE implementation process, teachers and students agreed to use five classroom rules: Follow all teacher directions promptly; stay on task in your assigned area; talk only when it is your turn; keep hands, feet, and objects to yourself; and respect the rights and property of others. Means and standard deviations for numbers of rule violations reported in full and partial implementation classrooms are presented in Table 4.

Table 4

Rule Violations in Full and Partial Implementation Total Quality Classrooms

Category/Variable	Implementation			
	Full		Partial	
	M	*SD*	*M*	*SD*
Week 1 violations	1.04	1.37	1.52	1.81
Week 2 violations	1.77	1.95	2.57	2.06
Week 3 violations	0.96	1.08	2.43**	1.86
Week 4 violations	2.00	1.83	3.24	2.77
Week 5 violations	2.19	1.77	3.71**	2.26
Week 6 violations	2.77	2.01	3.67	1.59
Week 7 violations	2.69	2.20	4.24**	2.41
Week 8 violations	2.12	1.48	3.81**	2.09
Week 9 violations	2.31	1.64	4.14**	2.03
Week 10 violations	1.81	2.14	2.57	2.44
Follow directions promptly	13.50	7.61	21.76**	10.92
Stay on task	0.19	0.19	0.40	0.40
Talk only in turn	0.96	1.11	2.14**	2.50
Keep to self	1.19	1.39	1.86	2.51
Respect others	3.81	2.68	5.95**	4.02
Total rule violations	19.65	8.71	31.90**	12.20
Total per child violations	0.76	0.34	1.52**	0.58

**Difference between means significant at 0.05 level.

Total rule violations were significantly greater ($t = -4.01$, $df = 45$, $p < 0.05$) in partial implementation classrooms ($M = 31.90$) than in full implementation classrooms ($M = 19.65$). Per child violations (total for class divided by number of children in the class) were also lower ($t = 5.65$, $df = 45$, $p < 0.05$) in full implementation classrooms ($M = 0.76$) than in other classrooms ($M = 1.52$). Significant individual rule differences were also noted in following directions promptly ($t = -3.01$, $df = 45$, $p < 0.05$), talking in turn ($t = -2.17$, $df = 45$, $p < 0.05$), and respecting the rights and property of others ($t = -2.19$, $df = 45$, $p < 0.05$). Low rates of rule violations were evident in all classrooms for staying on task in assigned area and keeping hands, feet, and objects to self. Weekly variation was evident in rule violations (see Figure 1); significantly fewer rule violations were recorded in full implementation classrooms during week 3, 5, 7, 8, and 9 of the observation period.
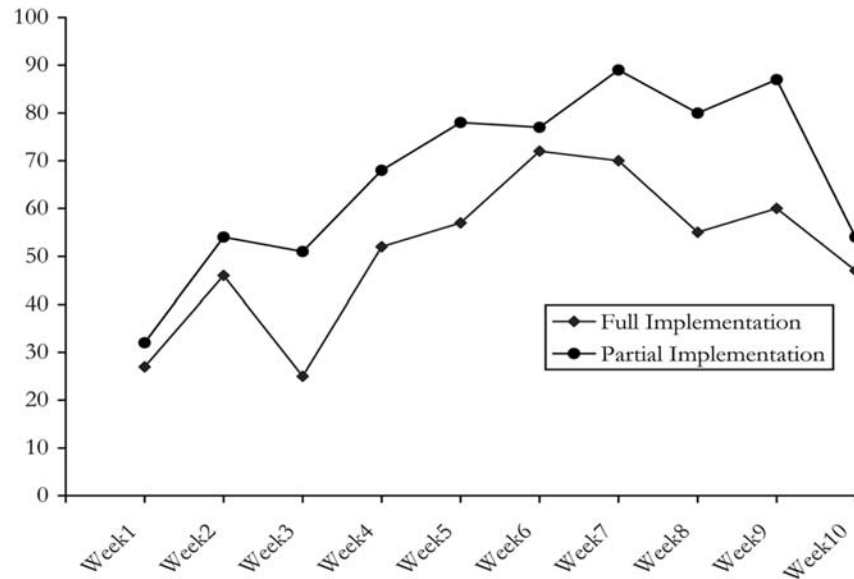
Figure 1. Rule violations over time in full and partial implementation total quality classrooms.

In general, data support the benefits of implementing Total Quality Education in elementary school classrooms. Significant differences favoring important teaching and learning behaviors (i.e., time on-task, teacher-students interactions, and classroom rule violations) were evident in comparisons completed between classrooms with different levels of implementation across reasonable periods of time (e.g., 10–36 weeks).

Discussion

Implementing Total Quality Education transforms classrooms and creates changes that should be evident in teaching and learning processes and behaviors. Our research demonstrated that it is possible to identify many of these differences using systematic observations focused on classroom activities and behavior, student involvement, teacher activities, and classroom rule violations. For example, improvements in total on-task and off-task behavior as well as paying attention, raising hand, disrupting class, looking around, talking inappropriately, and doing an inappropriate task were noted in classrooms of teachers evidencing higher levels of implementation for longer periods of time. These outcomes point to the importance of "dosage" on the outcomes of implementing new programs, and reflect the importance of time as a factor in changing schools, classrooms, and teachers.

Within the broad range of systemic and individualized strategies that define Total Quality Education, there are a myriad of possible implementation approaches. This research provides evidence to support a set of operationally-defined and replicable practices and their effects on key instructional behaviors associated with the interventions. Our work illustrates the effects of using strategies central to Total Quality Education, and highlights the differences in instruction that are evident in classrooms using these instructional techniques. Continuing use of these practices provides a foundation for what needs to be done to correct the low levels of positive instructional approaches evident in many classrooms, especially those with large numbers of students at risk for continuing school failure.

Context for Continuing Change

The classrooms in this study provided a unique opportunity to observe, identify, and describe processes of learning and teaching grounded in the organizational principles of Total Quality Management but unprescribed in terms of actual implementation. This study provides evidence that teachers can study their classroom processes and implement improvements that enhance the self-direction of students' learning and behavior. Within that evidence are interesting lessons and insights regarding the application of Total Quality Management principles in schools.

Traditional school missions. The processes of learning and teaching in traditional classrooms are almost always related to the needs of teachers to cover the curriculum and raise test scores (Brown, 1992; Hall & Kleine, 1992; Herman & Golan, 1990; Kozol, 1967; Jazzar & Algozzine, 2005). Many schools have published formal mission statements describing public purposes such as "…preparing contributing citizens" or "…being the premier, integrated school district in the … region." There is often little reference in these documents to students' responsibilities for learning and development (Audette, 1997; Gipp & Fox, 1991; Howley, 1990; Moses & Whitaker, 1990).

Often, formal missions in traditional schools are simply mottoes for public consumption developed for the purpose of rallying support and enthusiasm. There is little evidence that such formal mission statements have much impact in traditional K–12 classrooms. For example, in most schools, formal mission statements are seldom posted in classrooms (Audette, 1997). Similarly, students and teachers cannot provide an accurate description of the formal mission for their school. The formal school mission statement is usually irrelevant to daily instruction.

In contrast to formal published missions, the actual missions in most public schools are based on what is most publicly measured and most widely recognized (Audette, 1997). It is the actual mission that determines teachers' priorities and the processes of learning and teaching associated with their classrooms (Audette, 1997). There seems to be little doubt that in the conventional American public school, curriculum coverage and high test scores constitute the actual mission of public education.

Instead of the problem of the means justifying the end, this seems to be a case where the means have actually become the end.

The roles of teachers and students derive from their sense of the actual missions in their schools. The current emphasis is on attaining high scores on end-of-grade, standardized achievement tests. Teachers teach with end-of-year scores in mind. In contrast, participants in our study did not embrace or limit themselves to traditional school missions and the practices related to them.

Quality school missions. Unlike classrooms in traditional schools, the classrooms in our study were driven by learning missions developed by teachers with the active participation of their students, and with the consultation and support of many parents. While the specific wording and themes varied somewhat from classroom to classroom, the message and priorities were clear: (a) the learning and development of students and every member of the school community are central; and (b) the development of personal responsibility as expressed in purposeful, self-directed learning and behavior is essential.

Learning missions increasingly dominated every aspect of life in the study classrooms. Class mission statements were not only displayed, but are increasingly cited by students and teachers. Students and teachers use their learning mission as the critical context within which they make individual and classroom decisions. For example, one fourth grade class made the decision not to request a specific field trip because it was the consensus of the students that this particular field trip (a dinosaur exhibit), while interesting, would not contribute to their attainment of their learning goals for the next few months. In addition, they concluded that the field trip would cost them valuable learning time.

The class mission in quality-based classrooms is the basis for all assessment and evaluation. It establishes a learning emphasis that is detailed in students' goals and objectives. While standardized tests are still used in summative assessments of student achievement, the emphasis in quality-based classrooms is on continuous formative assessment and evaluation of learning in the form of projects and portfolios. In the classrooms observed for this study, assessment of the progress and quality of work was not only continuous but much of it was implemented by students who monitored and self-assessed the manner in which they managed their time as well as progressed toward their goals.

Perspectives on Quality

The role of teachers in guiding the processes described above requires the thoughtful exercise of developmentally sensitive leadership (i.e., making decisions based on the individual and group needs of a classroom). While their responsibilities are substantial, teachers in full implementation classrooms seemed to avoid the stress associated with worrying about things they could not control. Instead, they worked together with students on processes that they could control and improve (e.g., monitoring individual

student performances in basic skills and providing feedback and practice to facilitate improvements) to greater degrees than did their colleagues in partial implementation classrooms. They supported each other with the full confidence that comes from having a shared purpose. They encouraged each other when they had problems and celebrated their successes.

Teachers in full implementation classes established a culture of quality by championing the learning mission and clarifying their expectations and roles in its attainment for students and parents. They promoted students' natural motivation to learn by leading them in visioning exercises that "picture" their successful lives when they have met their learning goals (i.e., they asked students to think about or visualize differences that will occur as a result of learning new skills). They used a variety of Total Quality tools and methods to lead their students through a process of thinking together as a learning organization (Brocka & Brocka, 1992; McClanahan & Wicks, 1994). With their mission and their ground rules, students had clear boundaries within which they were actively engaged in learning and applying what they learned.

To an outside observer, the most dramatic difference in full implementation classrooms was in the roles and behavior of students. In contrast to their peers in other classes, students in these classrooms were much more purposeful, engaged, and responsible for their own learning and behavior. They were respectful and appreciative of their teachers, but they also expected reasons for requests that were made of them. They knew what they were doing; they knew why they were doing it; they routinely used data that showed how they were doing; and they had a clear picture in their minds of what their work would "look like" when it was finished.

There has been limited study of the effects of Total Quality Education or how the use of the principles and practices of TQE differs across classrooms and schools. The early attempts to implement quality principles in classrooms provide a solid basis for further and more extensive application and study. Teachers who are applying quality principles in these two schools consistently report that they want "…to go much deeper in their understanding and application of quality principles," and that "…the potential for unleashing students' untapped abilities to learn is staggering." The outcomes of this research illustrate that benefits to school improvement are part of the systematic application and monitoring of TQE in elementary school classrooms.

Implications for Future Research

The defined and replicable interventions and instructional process within TQE permit measurement of procedural fidelity and outcomes associated with the high levels of implementation. As the practices mature, other demonstrations of differences in classroom and student behaviors need to be defined, and evidence of effectiveness across other dimensions of dependent data (e.g., achievement) is essential. Replication studies, sustainability studies, and comparative studies of the effects of TQE are needed to advance the science of reform. Finally, studies of the

effects of comparative models on behavioral and academic performance are needed to build the research base for TQE interventions.

References

Aguayo, R. (1990). *Dr. Deming: The American who taught the Japanese about quality*. Secaucus, NJ: Carol.

Andrade, A., & Hakim, D. (1995). Letting children take the lead in class. *Educational Leadership, 53*(1), 22–24.

Audette, B., & Algozzine, B. (1992). Free and appropriate education for all students: Total quality and the transformation of American public education. *Remedial and Special Education, 13*(6), 8–18.

Audette, B., & Algozzine, B. (1997). Re-inventing government: Let's re-invent special education. *Journal of Learning Disabilities, 30*, 378–383.

Audette, R. (1992). The application of total quality in education. *Small College Creativity, 2*, 11–16.

Audette, R. (1997). *A study of the impact of school missions on school practices*. Unpublished manuscript.

Baugher, K. (1992). *LEARN: The student quality team process for improving teaching and learning*. Birmingham, AL: Samford University.

Boyer, E. (1992, April). *Connecting school learning to the lives of children*. Paper presented at the Charlotte-Mecklenburg Community Task Force, Charlotte, NC.

Boyer, E. (1995). *The basic school: A community for learning*. Princeton, NJ: The Carnegie Foundation for the Advancement of Teaching.

Brocka, B., & Brocka, M. (1992). *Quality management: Implementing the best ideas of the masters*. Homewood, IL: Business One Irwin.

Brophy, J., & Good, T. L. (1986). Teacher behavior and student achievement. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (pp. 328–375). New York: Macmillan.

Brown, D. (1992, April). *Altering curricula through state testing: Perceptions of teachers and principals*. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.

Caine, R. N., & Caine, G. (1991). *Making connections: Teaching and the human brain*. Alexandria, VA: Association for Supervision and Curriculum Development.

Candy, P. (1991). *Self-direction for lifelong learning*. San Francisco: Jossey-Bass.

Cohen, D. (1991). Overcoming student apathy and bewilderment: Setting an example of responsibility and attentiveness. *Proteus, 8*(1), 27–29.

Deming, W. (1986). *Out of the crisis*. Boston: MIT Center for Advanced Engineering Studies.

Dewey, J. (1902). *The child and the curriculum*. Chicago: University of Chicago Press.

Dewey, T., Jr. (1993). None of the above. *American School Board Journal, 180*(8), 35.

Downey, C., Frase, L., & Peters, J. (1994). *The quality education challenge*. Thousand Oaks, CA: Corwin Press.

Flantzer, H. (1993). What we say and what we do. *Phi Delta Kappan, 75* (1), 75–76.

Gipp, G., & Fox, S. (1991). Education: The real hope for American Indians. *National Forum, 71*(2), 2–4.

Good, T., & Brophy, J. (2000). *Looking in classrooms* (8th ed.). New York: Longman.

Hall, J., & Kleine, P. (1992). Educators' perceptions of NRT misuse. *Educational measurement: Issues and practice, 11*(2), 18–22.

Hau, I. (1991). *Teaching quality improvement by quality improvement in teaching* (Report No. 59, 20). Madison, WI: University of Wisconsin, Center for Quality and Productivity Improvement.

Herman, J., & Golan, S. (1990). *Effects of standardized testing on teachers and learning—another look* (Research Report). Los Angeles: National Center for Research on Evaluation, Standards, and Student Testing.

Heverly, M. (1992, May). *Applying total quality management principles in the classroom*. Paper presented at the 32nd annual forum of the Association for Institutional Research, Atlanta, GA.

Howley, A. (1990, April). *Teacher empowerment: Three perspectives*. Paper presented at the Southern Regional Council on Educational Administration, Atlanta, GA.

Jaffe, C. (1993). Tsunesaburo Makiguchi: Teacher, philosopher, value creator. *Teaching Education, 5*(2), 1–5.

Jazzar, M., & Algozzine, B. (2005). *Keys to effective educational leadership*. Boston, MA: Allyn and Bacon.

Juran, J. (1988). *Juran on planning for quality*. New York: Free Press.

Juran, J. (1989). *Juran on leadership for quality*. New York: Free Press.

Kohn, A. (1993). Turning learning into a business: Concerns about total quality. *Educational Leadership, 51*(1), 58–61.

Kozol, J. (1967). *Death at an early age*. Boston: Houghton Mifflin.

McClanahan, E., & Wicks, C. (1994). *Future force: A teacher's handbook for using TQM in the classroom*. Glendale, CA: Griffin.

Moses, M., & Whitaker, K. (1990). Ten components for restructuring schools. *School Administrator, 47*(8), 32–34.

Scherkenbach, W. (1991). *The Deming route to quality and productivity: Road maps and roadblocks*. Washington, DC: CEEP Press.

Scrabec, Q., Jr. (2000). A quality education is not customer driven. *Journal of Education for Business, 75*, 298–300.

Shewhart, W. (1986). *Statistical method from the viewpoint of quality control*. Mineola, NY: Dover.

Stallings, J. (1975). Implementation and child effects of teaching practices in follow through classrooms. *Monographs of the Society for Research in Child Development, 40*(7–8, Serial No. 163).

Stallings, J. (1980). Allocated academic learning time revisited, or beyond time on task. *Educational Researcher, 8*(11), 11–16.

Tribus, M. (1990). *The application of quality management principles in education at Mt. Edgecumbe High School, Sitka, Alaska.* Eugene, OR: ERIC Clearinghouse on Educational Management. (ERIC Document Reproduction Service No. ED370166)

Tribus, M. (1994, April). *TQM in education: The theory and how to put it to work*. Paper presented at the National Governors' Conference on Quality Education, Denver, CO.

Tyler, R. (1949). *Basic principles of curriculum and instruction.* Chicago: University of Chicago Press.

Washton, N. (1988, March). *Developing a faculty checklist for self-evaluation for teaching-learning effectiveness*. Paper presented at the annual meeting of the Professional and Organizational Development Network in Higher Education, Keystone, CO.

White, R., Marr, M. B., Ellis, E., Audette, R., & Algozzine, B. (2001). Effects of school-wide discipline on office referrals. *Journal of At-Risk Issues, 7*(2), 4–12.

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